CLAIMS

I claim:

1. An electron beam projection system comprising:

at least one process chamber, containing therein, at least one movable stage and at least one electric stage motor for moving the stage,

wherein the electrical stage motor includes magnetic coils encased in a coolant jacket which encloses the coils and encloses a coolant material,

wherein the coolant jacket includes coolant input lines for supplying coolant to the coolant jacket,

wherein the coolant jacket includes coolant return lines for allowing the coolant to flow out of the coolant jacket;

the process chamber including electrical leads for supplying electrical current to systems contained within the process chamber; and

wherein the electrical leads pass through the coolant lines.

2. An electron beam projection system as in Claim 1 wherein the at least one process chamber contains therein a vacuum environment.

3. An electron beam projection system as in Claim 2 wherein the electrical leads include electrically insulated electrical leads.

4. An electron beam projection system as in Claim 2 wherein the electrical leads are not electrically insulated; and

wherein the coolant contained in the coolant jacket consists of an electrically non-conductive coolant material.

5. An electron beam projection system as in Claim 4 wherein the electrical leads for supplying electrical current to systems include electrical leads for supplying electrical power to the electrical stage motor.

6. An electron beam projection system as in Claim 5 wherein the at least one movable stage includes a wafer stage for moving a semiconductor wafer during processing, and wherein the wafer stage includes an electrostatic chuck for securing the semiconductor wafer to the wafer stage, and wherein the electrical leads for supplying electrical current to systems further include electrical leads for supplying electrical power to the electrostatic chuck and wherein the electrical leads for supplying electrical power to the electrostatic chuck pass through the coolant lines.

7. An electron beam projection system having a process chamber containing therein at least one movable stage and at least one electric stage motor for moving the stage;

wherein the stage motor includes magnetic coils encased in a coolant jacket which encloses the coils and coolant,

wherein the stage motor includes electrical leads for supplying electrical current to the coils,

wherein coolant lines for supplying the coolant are connected to the coolant jacket, and

wherein said electrical leads are routed inside the coolant lines to cool the leads.

8. The electron beam projection system of Claim 7 wherein the stage motor comprises a multi-phase linear stage motor.

9. The electron beam projection system of Claim 7 wherein contains a vacuum processing environment.

10. The electron beam projection system of Claim 7, wherein said electrical leads are electrically insulated.

11. The electron beam projection system of Claim 10, wherein said electrically insulated electrical leads are spirally twisted together.

12. The electron beam projection system of Claim 7 wherein the coolant comprises gas coolant.

13. The electron beam projection system of Claim 7 wherein the coolant comprises liquid coolant.

14. The electron beam projection system of Claim 13 wherein the liquid coolant comprises a non-conductive liquid coolant.

15. The electron beam projection system of Claim 7, wherein coolant lines include pairs of coolant lines, each pair of coolant lines includes a first coolant output line and a second coolant output line and wherein said electrical leads comprise pairs of electrical leads arranged such that a first electrical lead of the pair of electrical leads is routed through the first coolant output line and such that such that a second electrical lead of the pair of electrical leads is routed through the second coolant output line.

16. The electron beam projection system of Claim 15, wherein each pair of coolant lines is configured in a twisted arrangement, wherein the first coolant output line and the second coolant output line are twisted about each other so that the first electrical lead and the second electrical lead are arranged in a twisted pair arrangement.

17. The electron beam projection system of Claim 7, wherein coolant lines include at least one coolant input line and at least one coolant output line and wherein said electrical leads are routed through the at least one coolant output line.

18. The electron beam projection system of Claim 17, wherein the coolant comprises a non-conducting coolant material and wherein the electrical leads are not electrically insulated.

19. The electron beam projection system of Claim 17, wherein said electrical leads comprise at least two electrical leads and wherein the at least one coolant output line

comprises at least two coolant output lines and wherein each of the at least two electrical leads is routed through one of the at least two coolant output lines.

20. The electron beam projection system of Claim 17, wherein the magnetic coils of the multi-phase stage motor form part of a three phase motor,

wherein the three phase motor includes six electrical leads for supplying electrical current to the coils,

wherein the at least one coolant output line comprises six coolant output lines, and

wherein each of the six electrical leads is routed through one of the six coolant output lines.

21. The electron beam projection system of Claim 20, wherein the coolant comprises gas coolant.

22. The electron beam projection system of Claim 20, wherein the coolant comprises liquid coolant.

23. The electron beam projection system of Claim 22, wherein the liquid coolant comprises a non-conductive liquid coolant.

24. An electron beam projection system as in Claim 7 further including an electrostatic chuck for securing a wafer during processing, wherein the electrostatic chuck includes electrical leads for supplying the chuck with electrical power, and wherein the electrical leads supplying power to the chuck are routed through the coolant lines.

25. A method for cooling electrical leads in a process chamber of an electron beam projection system wherein the process chamber includes at least one movable stage having at least one electric stage motor for moving the stage wherein the stage motor includes magnetic coils encased in a coolant jacket which encloses the coils and coolant and wherein coolant lines supply coolant to the coolant jacket and wherein the process

chamber includes electrical leads for supplying electrical current to systems contained within the process chamber, the method comprising:

flowing coolant through the coolant lines;

cooling the electrical leads by passing the electrical leads through the coolant lines whereby the electrical leads are cooled by the coolant.

26. A method for cooling electrical leads as in Claim 25 wherein the coolant lines for supplying coolant to the coolant jacket includes input coolant lines for passing coolant into the coolant jacket and at least one coolant return line enabling coolant efflux from the coolant jacket; and wherein

cooling the electrical leads by passing the electrical leads through the coolant further comprises passing the electrical leads through the at least one coolant return line whereby the electrical leads are cooled by the coolant.

27. A method for cooling electrical leads as in Claim 26 wherein the electrical leads for supplying electrical current to systems contained in the process chamber includes electrical leads for supplying electrical current to the stage motor and wherein

cooling the electrical leads for supplying electrical current to the stage motor by passing the electrical leads through the at least one coolant return line whereby the electrical leads are cooled by the coolant.

28. A method for cooling electrical leads as in Claim 27 wherein cooling the electrical leads by passing the electrical leads through the coolant lines for supplying coolant further comprises passing the electrical leads through a plurality of coolant return lines.